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Vol. 46, No. 4; p. 37-48

➔ INSIDE

A Patient Tale: A single case that speaks to the intensity of resistance to vaccines 40

The Past Is Prelude: A conversation with vaccine expert William Schaffner, MD 42

MRSA Makes a Stand: Opioid epidemic driving increasing community cases 43

IPs Prepare for Ebola: As outbreak continues in Africa, IPs again face the threat of an ill traveler walking through the ED doors. 44

New CDC TB Guidelines: May end routine annual HCW screening in favor of a baseline test on hire and retesting after an occupational exposure 47



Measles Makes an Unwelcome Comeback

Surging antivaccine movement threatens herd immunity

By Gary Evans, Medical Writer

As a measles outbreak recently reached 70 cases in Clark County, WA, public health officials and infection preventionists were collaborating to identify cases and their contact exposures and to coordinate safe entry into a hospital if care was needed.

“The most important thing we have discovered is the need to really look at our plans for how we partner on the contact investigations. That has been really difficult,” says **Dana Nguyen**, BSN, RN, CIC, infection prevention practitioner at Clark County Public Health in Vancouver.

Coordinating with infection preventionists in area hospitals has

been critical, says Nguyen, president of the Washington state chapter of the Association for Professionals in Infection Control and Epidemiology (APIC).

The contact follow-up often begins when an unvaccinated child contracts measles, exposing other members of his or her family who have also not been immunized. They are placed under local health restriction for the incubation period and advised to call ahead if they

need medical care so they can be isolated from other patients.

“We tell them if you need to seek care for any reason, let the EMS or the hospital know in advance that you are under local health restriction for measles,” Nguyen says. “Different hospitals have different

A SINGLE UNDIAGNOSED MEASLES CASE ENTERING A HOSPITAL EMERGENCY ROOM CAN SET OFF AN OUTBREAK RESPONSE THAT INCLUDES TIME-CONSUMING AND DISRUPTIVE CONTACT TRACING.

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processes. Some will greet them in the parking lot and access them before bringing them in with a mask on. Some will have them come to a certain door.”

The contact cases are running in the hundreds, she says, as measles outbreaks tend to be labor-intensive and expensive to contain. Some members of the local community are against vaccinating their children, an increasingly common problem as misinformation and false safety fears are amplified on the internet.

“We have very low vaccination rates in Clark County, which I hate to say was a perfect breeding ground for this,” Nguyen says.

As of March 8, 2019, the outbreak in Washington had reached 70 cases, primarily in the epicenter of Vancouver and surrounding Clark County. Of those cases, 61 were unvaccinated, and two had received one of the recommended two doses of the measles-mumps-rubella (MMR) vaccine. The remainder of cases had unverified vaccine status. Most of the cases — 51 — were children age one year to 10 years old. Two of the measles cases required hospitalization.

Nguyen says there may be a lull in cases but knocked on wood in expressing the hope that the outbreak may be finally ending. “We have been in incident command now for 53 days,” she says.

Four additional cases linked to the outbreak were identified in Oregon, and one case was diagnosed in Georgia. Collaborating with colleagues in Oregon across the Columbia River that borders the states has been a positive aspect of the outbreak, she says.

“Bugs don't care about rivers or state lines,” Nguyen says. “We have a really strong collaborative community here across the state lines, and I think that has really helped us get our arms around this faster. That part of this has been really powerful.”

By the same token, the outbreak has enabled some face-to-face conversations with community members and patients about the importance of the vaccine for measles and other childhood diseases.

“We've had lots of opportunities to educate, to advocate, and to partner,” she says. “Our hospitals and the local APIC chapter have all been working collaboratively to attack this from all directions. It is such a profound concern.”

Indeed, in one of the three preceding measles outbreaks in Washington over the last decade, an immune-compromised patient died after acquiring measles in a clinic waiting room.

“Sometimes, people become complacent [about vaccine],” Nguyen says. “They listen, but I don't know that we are in a position to meet them where they are at. When you have 70 cases of measles in your community, how do you ignore that? You kind of can't.”

In that regard, as this report was filed, state legislators in Washington were trying pass a law that would remove the personal and philosophical exceptions to vaccine requirements. Other states are acting, too, and some are urging federal action to make childhood vaccines mandatory given the current situation. (*See related story, page 40.*)

Congressional Hearing

“Currently, there are six ongoing but completely preventable measles outbreaks in the U.S., including one in Washington, three in New York, one in Texas, and one in Illinois,” said **John Wiesman**, DrPH, MPH, of the Washington State Department of Health in Seattle, at a March 5, 2019, hearing of the U.S. Senate Committee on Health, Education, Labor, and Pensions.

Testifying on the resurgence of vaccine-preventable diseases, Wiesman said compared to Washington's prior measles outbreaks over the last decade, "this one is larger and infecting people faster."

Measles is considered one of the most contagious of the infectious diseases. It is a true airborne pathogen — not just droplet — and can also spread from contaminated surfaces and fomites near the infected patient. Thus, the CDC recommends patient placement in an airborne infection isolation room. If this type of room is unavailable, mask the patient and place him or her in a private room with the door closed, the CDC recommends.

Healthcare workers caring for the patient should be immunized against measles but also wear an N95 respirator due to some reports of vaccine breakthrough. Measles has an incubation period that is generally in the range of 14 days but can be as long as three weeks. That means travelers from one of the many global outbreak areas may become symptomatic and infectious after arrival in the U.S.

"We know that an individual traveled to Washington state from Europe who was already infected — but not yet symptomatic — with a wild strain of the measles virus circulating there," Wiesman says.

The U.S. may be a victim of its own success, declaring measles eradicated in the nation in 2000 and inadvertently opening a yawning door to public complacency. The full vaccination schedule was and is still recommended, as measles will still circulate in parts of the world. In the U.S., with an effective measles vaccine preventing most cases since the early 1960s, the current resurgence of infections finds even nursing and medical students shocked to learn about conditions before vaccination began, says **William Schaffner**, MD, a professor

of preventive medicine at Vanderbilt University in Nashville, TN.

"When I tell our medical students that before we had vaccine, 400 to 500 people in the U.S. died each year due to measles and its complications, their jaws drop," he says. "They have no concept of how severe measles can be, and that in the developing world it continues to be a major killer of children."

Indeed, the World Health Organization offers this grim global snapshot: "Even though a safe and cost-effective vaccine is available, in 2017, there were 110,000 measles deaths globally, mostly among children under the age of five."¹

In the U.S., measles caused more than 500,000 infections prior to vaccine development, **Jonathan McCullers**, MD, chief pediatrician at Le Bonheur Children's Hospital in Knoxville, TN, said at the Congressional hearing.

"It is a very dangerous disease — about one in 1,000 infected persons develop encephalitis, an infection of the brain," he testified. "About one in 1,000 develop severe pneumonia, and about half of those with these severe complications die. There is no specific treatment for measles, so vaccination is the only means of preventing these outcomes."

In 2018, 372 people contracted measles in 17 different outbreaks in the United States, he said.

Delayed Diagnosis

Outbreaks continue in 2019, but measles is still so rare that many clinicians have never seen a case. They find the infection difficult to diagnose, leading to the subsequent chaos of determining who was exposed and susceptible among other patients and staff.

"There is delayed diagnosis," Schaffner says. "They see this child who

is miserable, has conjunctivitis, a runny nose, cough, and a rash. They have no idea what it is, and they start thinking about all of these other viral diseases simply because they have not seen measles before."

A single undiagnosed measles case entering a hospital emergency room can set off an outbreak response that includes time-consuming and disruptive contact tracing. "It creates a whole disruption to the system in terms of assessment and follow-up," says **Karen Hoffmann**, RN, MS, CIC, FSHEA, FAPIC, president of the national APIC. "That is problematic."

And expensive. For example, a single imported case of measles ultimately cost two Arizona hospitals some \$800,000, with much of the expense related to ensuring the immunity of employees and furloughing exposed workers.²

Hospitals typically require new employees to receive two doses of the MMR vaccine or show proof of immunity. People born before 1957 may be presumed to be immune, according to CDC guidelines — although in the event of an outbreak, the CDC recommends that healthcare workers born before 1957 receive two doses of MMR.

In general, IPs and their partners in public health need to emphasize that there is no scientific controversy, Hoffmann says. "The vaccines are safe — the only controversy is in the lay public," she says. ■

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A Patient Tale That Beggars Belief

The antivaccine movement is deeply entrenched

Amid ongoing measles outbreaks and the threatened return of other vaccine-preventable diseases, we begin with a single case that speaks to the intensity of resistance some parents have to childhood immunizations.

A six-year-old boy in Oregon, who had never received the tetanus shot or other routine childhood immunizations, cut his forehead while playing outside. His parents cleaned and sutured the wound, but six days later, an infection developed likely due to *Clostridium tetani*, bacterial spores commonly found in soil, the Centers for Disease Control and Prevention (CDC) reports.¹

The diphtheria, tetanus, and acellular pertussis (DTaP) vaccine is recommended for children under seven, with the first three doses given to infants at two, four, and six months. The vaccine is a large part of the reason there has been a 95% decrease in tetanus — including a 99% reduction in fatal infections — since the 1940s, the CDC reports. If not given, however, the vaccine is 100% ineffective.

The child in Oregon began experiencing brutal neuromuscular symptoms associated with this infection.

These included “episodes of crying, jaw clenching, and involuntary upper extremity muscle spasms, followed by arching of the neck and back, and generalized spasticity,” the CDC reports. “Later that day, at the onset of breathing difficulty, the parents contacted emergency medical services, who air-transported him directly to a tertiary pediatric medical center.”

Diagnosed with tetanus, the boy was an inpatient in a pediatric ICU for 47 days, so sensitive to light and

sound he wore earplugs under care in a darkened room. “He was alert and requested water but was unable to open his mouth,” the CDC noted.

Spasms and respiratory distress set in, and the child was sedated, intubated, and placed on a vent.

Tetanus immune globulin and DTaP were given, and the patient received IV treatment to block muscle spasms and control pain and blood pressure. A tracheostomy was placed for prolonged ventilator support and was not removed for 30 days.

“YOUNG PARENTS DO NOT HAVE ANY EXPERIENCES WITH THESE DISEASES ... THEY DON'T KNOW THEM. IF YOU DON'T KNOW THE DISEASE, AND RESPECT OR EVEN FEAR IT, YOU WON'T VALUE THE VACCINE.”

After the child recovered, the ICU stay was followed by more than two weeks of additional rehabilitation therapy. He completely recovered after receiving medical care costing some \$812,000. Despite that cost and the near death of their child, the parents made an astonishing decision.

Although clinicians explained that tetanus infection does not confer immunity — meaning the child needed to complete the vaccination schedule to avoid future infections — the family declined all immunizations, the CDC concludes.

“Now that’s an antivaccination

family,” says **William Schaffner**, MD, professor of preventive medicine at Vanderbilt University. “Despite their son’s incredible life-threatening illness, they still declined vaccination.”

Albeit extreme, this is the kind of mindset vaccine advocates are up against. The CDC “describes this very concisely, but you cannot imagine the agony of this illness for this child,” he says.

A nationally known vaccine advocate, Schaffner says clinicians and public health are in for a protracted battle to overcome resistance to vaccinations. For example, better health education is needed in schools to teach children about vaccines and the untold number of lives saved by them. (*See related story, page 42.*) At present, one of the greatest public health achievements of all time is being eclipsed by misinformation and rumor. For example, smallpox — a scourge on mankind for thousands of years — was eradicated in the wild by vaccination.

The major reason people now have “vaccine hesitancy” is because immunization has been so successful that the diseases they are designed to prevent have been essentially eliminated in the U.S., he says. “Young parents do not have any experience with these diseases growing up,” he says. “They don’t know them. If you don’t know the disease, and respect or even fear it, you won’t value the vaccine.”

Science Strikes Back

Although it has been amplified exponentially by the internet, the antivaccine movement is generally traced to an infamous 1998 article in *The Lancet*

that fueled fears that the measles-mumps-rubella (MMR) vaccine may cause autism. This article was “proven to be false” and fully retracted by the journal in 2010 after years of criticism from the medical community.²

Science recently struck back, with a massive study involving more than 650,000 children in Denmark. The researchers compared autism rates in unvaccinated children and those who had been immunized against measles, finding that “MMR vaccination does not increase the risk for autism, does not trigger autism in susceptible children, and is not associated with clustering of autism cases after vaccination.”³

“That is a huge, powerful study,” Schaffner says. “The Danes have medical care from birth to death, and they have a totally comprehensive medical record on everybody.”

With the current appeal and constant repetition of various and sundry conspiracy theories, Schaffner says it was just as well the study was not published in the U.S.

“It is important that it was done in Denmark and not in the United States,” he says.

“I have heard on occasion from antivaccine folks that we in the U.S. have created this ‘myth’ of vaccine safety.”

Added to the accumulated weight of preceding data, the Danish study should finally put the autism-MMR link to the sword. “If this doesn’t put — at least scientifically — the question to rest, nothing ever will,” Schaffner says. “But I don’t think the antivaccine folks will be convinced. They have not been moved by data in the past.”

Anecdotal Reports

Indeed, many websites and social media platforms are riddled with

vaccine misinformation, says **Karen Hoffmann**, RN, MS, CIC, FSHEA, FAPIC, president of the Association for Professionals in Infection Control and Epidemiology.

“We know that vaccines are the safest proven way to prevent disease,” she says, adding that she recently tried to make this very point to a relative at a family gathering. Hoffmann said one of her relatives explained she was not immunizing her child because her pediatrician said that all of the vaccines are not necessary.

Such anecdotal accounts are not uncommon, as a recently published commentary by public health experts cited “some pediatricians who publicly cast doubt on vaccine safety.” Given the ongoing outbreaks and inconsistent state laws, the authors called for the federal government to mandate vaccinations.⁴

Asked to respond, the American Academy of Pediatrics (AAP) said it was aware of no such reports involving its 67,000 members. However, the AAP added, not all pediatricians are members of the group.

Given the situation, Washington state was taking legal action to remove personal exemptions as this report was filed.

Jonathan McCullers, MD, chief pediatrician at Le Bonheur Children’s Hospital in Knoxville, TN, outlined the current state regulations at a recent Congressional hearing on the issue.

“Three states currently only allow medical exemptions from vaccination — California, Mississippi, and West Virginia. These states all have vaccination rates for measles at the age of school entry at 97% or better — above the 96% level needed for herd immunity.”

However, 30 states allow for religious vaccine exemption, and 17 allow both religious and “personal”

exemptions, he added. “Allowing multiple pathways to exemption worsens this problem,” he said.

“Of the five states that have less than 91% vaccination rates — Colorado, Idaho, Indiana, Kansas, and Washington — three allow both types of exemptions.”

In California, both types of exemptions were allowed until a large measles outbreak at Disneyland in 2014-2015 prompted revisions in the law.

They “eliminated non-medical exemptions, and the vaccination rate has returned to 97%,” McCullers said.

Another factor in the California outbreaks was the practice by some parents of delaying or spacing out childhood vaccines instead of correctly following the immunization schedule.

“The vaccine against measles is very safe and effective,” he said. “The first dose of MMR protects about 93% of children, while a second dose extends immunity to 97%. Very few side effects occur.”

In that regard, about one in 10 children experience fever for a day or two. About one in every 3,500 children will have “a simple seizure” with fever, but no lasting effects.

“Allergic reactions are very rare and typically very mild,” McCullers said. “No reactions or adverse effects of a more severe nature have been associated with the vaccine despite extensive use, monitoring, and study for many decades.”

Considering all childhood vaccines, immunization programs in the U.S. prevent more than 1 million infections and more than 10,000 deaths from disease every year, testified **Saad B. Omer**, MBBS, MPH, PhD, a professor of epidemiology and pediatrics at Emory University in Atlanta. “To put

that into perspective in the current day,” he said at the hearing, “without childhood vaccines, the states of Tennessee and Washington would be dealing with between 24,000 and 37,000 vaccine-preventable diseases in an average year, and between 250 and 275 children would die, most of them under the age of five.”

Currently, measles is hovering close to the herd immunity “threshold,” meaning as the vaccination level of the population drops below 97%, more

widespread outbreaks become likely, he said. ■

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Vaccines: We Forget the Past, Risk Repeating It

A conversation with vaccine expert William Schaffner

One of the nation’s foremost experts and advocates of vaccines, **William Schaffner**, MD, is the recipient of multiple honors and awards from infection prevention and control groups, and currently serves as medical director of the National Foundation for Infectious Diseases (NFID) in Washington, DC. A longstanding board member of *Hospital Infection Control & Prevention*, Schaffner is a professor of preventive medicine at Vanderbilt University in Nashville. He is a liaison member representing the NFID on the CDC’s Advisory Council on Immunization Practices (ACIP).

HIC asked Schaffner to comment on the current state of the antivaccine movement and the return of some childhood diseases like measles in the following interview, which has been edited for length and clarity.

HIC: You say we are going to be dealing with this antivaccine mindset and its resulting impact on public health for some time.

Schaffner: Yes, we are going to have continuing “vaccine

hesitancy” as well as more explicit antivaccination sentiment. It’s not going to go away. Sad but true. There is this educational gap, and that is going to continue. If anything, it will expand as we create more vaccines to prevent more diseases.

The antivaccine sentiment is so deeply rooted. In my experience, and also in talking to my colleagues, it is very difficult to change the mindset of people who are intensely antivaccine.

HIC: We certainly saw that in the reported tetanus case. What kind of approaches could be taken?

Schaffner: One of the things that has received little discussion is the educational component. We really need to look at the health curriculum of middle school and high school students. Some colleagues and I have taken some brief looks at this. Certainly not a survey, but we’ve made some inquiries.

Our sense is that the diseases that vaccines have prevented are almost never discussed. They may be mentioned fleetingly. Vaccines themselves — their benefits, how

developmental disorder in children. *Lancet* 2010;375:445.

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4. Ratzan SC, Bloom BR, Gostin LO, et al. States are failing on vaccinations. The federal government must lead. *Washington Post*. March 7, 2019. Available at: <https://wapo.st/2J3ydP2>.

they work, why it is important to get them — are dealt with in a very sporadic and insufficient fashion. If that is true generally — and I believe it is — then we should not be surprised that as high school graduates get older and become parents, they don’t have the background to understand vaccine-preventable diseases and why their baby needs a number of inoculations in order to prevent these diseases.

We, in the medical and public health community, have to look to partner with the educational community. We have to get the curriculum in middle school and high school beefed up about vaccines and vaccine-preventable diseases.

HIC: There is this prevailing myth that prior to the vaccine, kids just went through measles infection like some benign rite of passage.

Schaffner: I’ve had discussions with colleagues who tell me the same thing. You have a discussion with a young mom who says, “Everybody used to get measles. It’s an illness with a rash. It comes and goes — what’s the big deal?” That is a total misunderstanding of what a severe,

nasty infection measles usually is — making children uncomfortable for a week and a half or two. Never mind the complications of otitis media, pneumonia, encephalitis, and children dying of measles. When you tell them, they say, “I never heard that.”

The young trainees in medical school are people who come out of our society. There are some surveys indicating that these young people are not as educated about the vaccine-preventable diseases and are not themselves convinced that all these vaccines are necessary.

We must look to our own environments in nursing schools, medical schools, and other health-related professions to make sure that we don't take the commitment of young trainees in nursing and medicine for granted. We have to teach them.

HIC: Do we need more vaccine state laws or regulations?

Schaffner: I think all 50 states have to begin enforcing the daycare and school immunization laws. They need to look very critically about whether they should permit religious

and personal belief exceptions. There are states that have eliminated those. The two most well-known are West Virginia and Mississippi, both of which are very socially and politically conservative. They seem to have done that with great success, so there are lessons there. California has been added on recently.

Even the states that have these exemptions ought to look to them with care. And frankly, we ought to review the practices of physicians who glibly provide erroneous medical exceptions that are not valid. They ought to be obliged to explain their practice and if necessary have their practice supervised and corrected. I think it is unethical to provide a medical exemption that is not valid.

HIC: Antivaccine protestors are an online presence, but many attended the last CDC ACIP meeting in February.

Schaffner: It was evident in the October meeting that there were a number of antivaccine folks there. They were saying on social media that many more would come to the next ACIP, and there was an avalanche of people registering. The

CDC enhanced security and put the proverbial velvet rope between the public seating and the members of the committee. Security was wonderful and everybody behaved, so that was very nice.

The ACIP organizers created a 75-minute public comment period in the tradition of transparency. They had a whole list of people signed up for public comment. As is always the case, they had three minutes each. There were prompts so they kept to their three minutes, and they were good about it. They had ample opportunity to make their positions known, and everybody on the committee, including all the liaison members, remained. Decorum was maintained, and it was all very civil.

HIC: Thankfully, that was the case, but recent congressional testimony by some public health officials in Washington state described negative messages on social media from antivaccine groups.

Schaffner: So far, I have been spared, but some of the ACIP members tell me they are starting to get communications from these antivaccine folks. ■

Once in Retreat, MRSA Makes a Stand

Opioid epidemic driving community cases

Once the undisputed tyrant of healthcare-associated infections, MRSA has been reduced in recent years through such highly effective measures as using checklists to aseptically insert central venous catheters.

Unfortunately, methicillin-resistant *Staphylococcus aureus* is back in a big way. Susceptible strains of staph — MSSA — are also still part of the problem. In 2017, 119,000 people acquired

bloodstream staph infections in the U.S., and nearly 20,000 died, the Centers for Disease Control and Prevention (CDC) reports.¹

As a result, the CDC is no longer on track to meet the 2020 goal of a 50% reduction in hospital-onset MRSA bloodstream infections from the 2015 baseline.

“In healthcare settings, MRSA bloodstream infections decreased by approximately 17% each year between 2005 and 2012,” says

Anne Schuchat, MD, principal deputy director at the CDC. “But our progress slowed after that, with no significant change during 2013 through 2016.”

While MRSA gains have stalled, bloodstream infections caused by MSSA in the community have actually increased 3.9% annually in 2012–2017. The national opioid epidemic is exacerbating the problem, Schuchat says.

“We've previously reported the rise

in staph infections in the community may be linked to the opioid crisis,” she said at a recent press conference. “In fact, in 2016, 9% of all serious MRSA infections happened in people who inject drugs — rising from 4% in 2011.”

Infection preventionists should be aware that people who inject drugs are 16 times more likely to develop a serious staph infection. “Healthcare providers and community workers can also be on alert for infections among people who inject drugs and help facilitate those people getting the help they need,” she said.

Have Contact Precautions Lagged?

As IPs are aware, MRSA patients should be placed in contact isolation, including wearing gowns and gloves when entering the patient room.

“Overall, we think that the plateau we’re seeing may be related to reduced use of contact precautions and reduced following of CDC’s recommendations,” she said.

Asked to expand on this issue at the press conference, Schuchat said, “We strongly recommend that everybody use contact precautions and that they evaluate their data. Ideally, not just a single facility but a community pulling together the different facilities in the community, long-term care facilities as well as hospitals.”

The CDC data were gathered from

its emerging infections program in six states and two electronic databases that included some 400 hospitals. The data also are consistent with infections being reported by IPs to the CDC National Healthcare Safety Network.

“The bottom line is we have prevented many staph infections,” Schuchat said. “But while we’ve made important progress, our data show that more needs to be done to stop all types of staph infections.”

There are success stories at reducing MRSA infections, including infection control teams that protect ICU patients by using decolonizing chlorhexidine baths and mupirocin in the nares. In addition, the Veterans Affairs (VA) hospital system has reduced MRSA by using active screening on admission, a measure the CDC does not routinely recommend unless warranted by the prevalence of MRSA in the patient population.

“We have an exception with the VA, which has continued to see progress, but we think the plateau may be that hospitals and healthcare providers perhaps have tired of instituting the intensive recommendations,” she says.

Time certainly has not mitigated MRSA infection severity, as the case fatality rates remain relatively unchanged, she added. “We don’t see a drop in the fatality of either MRSA or sensitive staph in terms of the electronic health record data that was looked at,” she said.

“So, we think that while individual hospitals, healthcare facilities,

communities, and certainly the VA system may be continuing to make progress, the national plateau that we’re seeing probably stems from dropping off in using the intensive recommendations.”

The other factor is the rise in opioid addiction, with frequent use and reuse of needles contributing to staph infections. “We think that the national trend we’re seeing with the opioid epidemic and the extensive use of injecting drugs may be an additional burden that’s leading to the plateau,” she says.

One take-home point is that if IPs are continuing to see MRSA infections, consider adopting additional measures such as targeted screening of incoming patients and decolonizing patients before high-risk surgeries.

“We don’t at this time think there’s ‘one size fits all’ for the decolonization or some of the other steps like screening on admission,” Schuchat says.

“We certainly think it’s worth considering those steps in particular circumstances. This is a very serious infection, and we think it’s very much worth preventing.” ■

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IPs Prepare for Ebola as Outbreak in Africa Continues

Many confused about new tiered Ebola hospital system

As an Ebola outbreak continues in the Democratic Republic of Congo (DRC), infection preventionists again

face the threat of an ill traveler from the region walking through the doors of their EDs.

“I think we are better prepared now than we were in 2014 in relation to federal guidance, checklists, and

information,” says **Karen Hoffmann**, RN, MS, CIC, FSHEA, FAPIC, president of the Association for Professionals in Infection Control and Epidemiology.

Although hospitals are generally better prepared than when the last Ebola outbreak began, there is some concern that facilities do not completely understand their roles in the new tiered healthcare network adopted after the 2014 outbreak, she says.

A government report¹ found that many hospitals did not understand their roles in the tiered Ebola hospital system that was adopted after the chaotic response to the 2014 outbreak.

“About a third of hospital administrators could not verbalize their hospital’s designation related to the Ebola tiered system,” Hoffmann says. “That is concerning. There is also a lot of concern among all the hospital systems about sustaining their level of preparedness because of so many competing priorities.”

The tiered healthcare response system includes frontline hospitals, assessment facilities, and designated treatment centers. The vast majority of U.S. hospitals are considered “frontline,” which according to the Department of Health and Human Services² means they should be prepared to:

- rapidly identify and isolate a suspected Ebola patient;
- notify appropriate facility staff and public health authorities. Contact an assessment hospital or Ebola treatment center to coordinate patient transfer;
- have enough Ebola personal protective equipment (PPE) for at least 12 to 24 hours of care.

At the next level, there are 217 Ebola assessment hospitals with lab testing capabilities, enough PPE for 96 hours, and a system to remove highly infectious waste.

In addition, the hospital network has 63 designated treatment centers, which

have the capability to care for at least two Ebola patients for their duration of illness.

Beyond the elaborate measures, simple things can save lives. Infection preventionists should ensure travel history questions are asked on patient entry, Hoffmann says. “Not so much just for Ebola, but all emerging infectious diseases,” she says. “That is so important, and I know it is not always being done. We really need to re-emphasize this point to infection preventionists.”

Johns Hopkins is one of 10 designated Ebola treatment centers across the country that employ “enhanced capabilities” such as designated biocontainment units and other control and treatment measures. Despite that, the hospital still has to be ready for an ill traveler walking into the ED.

In this sense, the basic principles of “identify, isolate, and inform” apply to all facilities, says **Jennifer Andonian**, MPH, senior infection control epidemiologist and program manager for the Johns Hopkins Biocontainment Unit. “The only way we are going to be able to ensure the safety of our healthcare workers is to start with the initial identification of these patients,” she says.

That 2014 outbreak was characterized by a lot of confusion about PPE, particularly the finding that healthcare workers frequently contaminated themselves doffing their PPE. That may have been a factor in the case of two Dallas nurses who contracted Ebola but survived after caring for a dying patient from West Africa.

The basic PPE needed is considerable in the new tiered system, even for frontline hospitals that will be looking to quickly hand off a patient to one of the Ebola assessment facilities. The CDC recommendations for possible cases

of Ebola in frontline hospitals include such PPE as disposable fluid-resistant coveralls and gowns; a single-use full-face shield; and two pair of gloves that include one with extended cuffs.³ More extensive measures are recommended if a suspected or confirmed Ebola patient is bleeding or vomiting.⁴

“It does take a lot of resources to prepare,” Hoffmann says. “[With PPE], it’s kind of like muscle memory. If healthcare facilities really aren’t maintaining their competencies on specialized care, PPE, and other equipment as they need, they are not going to be able to maintain their preparedness.”

Infection preventionists assisted healthcare workers in correctly removing the PPE in a recent drill at Hopkins. “If a healthcare worker was to become contaminated, we have training and protocols in place to remediate that depending on the severity,” Andonian says.

For example, healthcare workers involved in the care of Ebola patients can communicate by a mobile phone app to report any symptoms. “That allows us to send text message prompts for symptom monitoring,” she says.

“That is something we do for any healthcare worker who comes into contact with the patient themselves. We apply similar principles if someone had an exposure, depending on how high-risk.”

In addition to a focus on donning and doffing PPE, the Hopkins drill emphasized the importance of avoiding contaminating the patient care area and the surrounding environment in general. A lot of this is “spatial awareness” when working within patient rooms, in addition to establishing “clean spaces” and using mechanical disinfection systems or surface wipes, Andonian says.

Setting up protocols and practicing such measures will bolster treatment

and response for pathogens more common than Ebola, she adds.

“These practices really transcend beyond high-consequence pathogens,” Andonian says. “These principles can help identify patients with measles, chickenpox, or tuberculosis. If we can do the basics really well, we should have better systems in place to identify these high-risk but low-probability cases.”

Ebola Simmers in the DRC

Meanwhile, as the Ebola outbreak in the DRC threatens to spill beyond its borders and get into more populated urban areas, there are increasing calls for a greater global response.

“We saw when we had a lot of resources from multiple agencies and countries that they were able to turn around the 2014 outbreak,” Hoffmann says. “I think they need to allow the amount of resources needed to turn around this outbreak.”

As of March 5, 2019, the Ebola outbreak in the DRC region of North Kivu had reached 907 cases (841 confirmed and 66 probable), the World Health Organization reports.⁵ Overall, there have been 569 deaths, a case fatality rate of 63%. Earlier reports indicate at least 68 healthcare workers have been infected and 21 have died. The outbreak began in August 2018.

An experimental vaccine has been deployed that was found to be highly effective in one trial,⁶ but amid the chaos of disease, civil unrest, and armed conflict, no scientific assessment of vaccine efficacy in the DRC has been reported.

“The unofficial impression from the folks on the ground there is that it has been effective, but I think there are some instances in which people have been vaccinated and haven’t been protected, which is pretty common

with any vaccine,” says **Jennifer Nuzzo**, DrPH, SM, a senior scholar at the Johns Hopkins Center for Health Security in Baltimore.

Healthcare workers are vaccinated pre-emptively, but the strategy for the general population is ring vaccination. “When a case is identified, they try to find their contacts and offer them vaccine,” she adds.

“Healthcare workers are one of the few, if not the only, groups that do not have to be tied to cases in order to get vaccine,” she says.

“Some people have called for an enlargement of pre-emptive vaccination that they are doing, some kind of geographic campaign to try to anticipate where future cases may be headed. So far, that hasn’t been done.”

Nuzzo says the situation in the DRC is deteriorating and urged action in a recent commentary on the outbreak.⁷ Concurring in this concern is **Lawrence Gostin**, JD, a professor of global health law at Georgetown University in Washington, DC.⁸

“It’s definitely getting worse,” he says. “I think the World Health Organization made an error in not calling a global emergency in October [2018]. At the time, the situation on the ground met the criteria for a Public Health Emergency of International Concern.”

Nuzzo agrees, saying the highest level of emergency has not been called because “It’s very political. The fear is that countries would take non-evidence-based actions, like decide to make it harder to travel to and from the area.”

An Ebola care center established by the highly respected Doctors without Borders volunteer group was recently destroyed. The CDC — the healthcare agency that probably has the greatest Ebola expertise in the world — was previously pulled from the DRC due to the security concerns.

In what is likely to be a sign of future outbreaks, the DRC is suffering

co-epidemics of disease and violence. Rather than withdraw, the world must step in to secure the region and stop Ebola before it gets into more urban, mobile populations, Gostin argues. “Job one is to protect health and humanitarian workers,” he says.

“We should never be in a situation where people have to put their life on the line to provide care. We should also quell the violence so the CDC can be back on the ground in the hot zone providing their expertise.”

The UN mission preceded the Ebola outbreak, and they are there for general peacekeeping. They are not trained, nor do they have a specific mandate to protect healthcare workers, he explains.

“The potential for global spread is ever-present,” Gostin says. “Certainly, the greater danger is to the region. Imagine if it gets across the border to Somali or Uganda or to major cities — it would spread like wildfire. If it carries on the way it is, it will only be a matter of time before it appears in a major global city in the U.S. or Europe.” ■

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New CDC TB Guidelines Will Emphasize Blood Tests

Workflow may get a little smoother for infection preventionists who also wear an occupational health hat. The CDC is expected to soon issue new tuberculosis testing guidelines for healthcare workers that will end routine annual TB screening in favor of a baseline test on hire and retesting after an occupational exposure, *Hospital Infection Control & Prevention* has learned.

The revisions come as TB testing and treatment have improved, while the routine risk of healthcare workers acquiring TB at work has steadily declined.

“There is no literature to support that healthcare workers are at occupational risk of contracting TB from their patients anymore,” says co-author of the guidelines, **Wendy Thanassi**, MD, MA, MRO, a professor at Stanford University and chief of occupational health Services at the VA Palo Alto Health Care System.

Other factors in the decline of TB as an occupational threat are the engineering controls and prevention measures that have become routine in many hospitals.

“Hospitals have done such a good job with environmental controls — negative pressure rooms, air filters, air circulation, and identifying patients

and wearing masks early,” she says. “We have seen transmission decline because of these environmental controls.”

The CDC reported 9,093 new cases of TB in the United States in 2017.¹ That translates to a rate of 2.8 cases per 100,000 people, a decline of 2% from 2016 that continues a trend of TB reduction.

For example, in 2000, there were 16,308 new cases of TB, a rate of 5.8 per 100,000 people. However, TB is still a threat, and IPs should remain vigilant.

“Active TB has a 10% mortality rate,” Thanassi says. “But it is very rare that we find it incidentally in a healthcare worker without finding it first in a source [patient].”

Some healthcare workers from countries with higher TB prevalence may have been administered the Bacillus Calmette-Guérin (BCG) TB vaccine, which is not routinely administered in the U.S. Those vaccinated may have a cross-reaction to a TB skin test, registering a false positive. The CDC currently recommends use of the TB blood tests for workers who have been immunized with BCG.

The new guidelines are expected to encourage broader use of the TB blood tests over the traditional skin

tests, which often are performed in a more labor-intensive two-step approach to ensure accuracy. However, the new guidelines will likely state that those using traditional skin tests can continue to do so, as the CDC typically defers to local preferences rather than a one-size-fits-all approach in its recommendations.

Having used the TB blood tests exclusively for years, Thanassi says the focus should be using the blood tests on hire and treating latent TB at that point rather than conducting routine screening thereafter.

There also are new effective treatments of shorter duration for healthcare workers with latent TB, which can remain dormant for years before activating.

As this report was filed, the CDC had not issued the new guidelines. While Thanassi expected they would be released soon, a CDC spokesman was less definitive.

“We are reviewing the current guidelines and may update them later this year,” says **Scott Bryan** of the CDC National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention.

As of press time, the current CDC guidelines² say facilities can use the TB skin test or blood test for



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healthcare workers at baseline, and then retest thereafter depending on risk categories. Risk factors include the prevalence of TB in the patient population and the community.

Hospitals at medium risk are recommended to test healthcare workers annually.

The new CDC guidelines are expected to drop the risk categories, essentially conflating them down

to the low-risk recommendation of retesting healthcare workers only if there has been a TB exposure incident, Thanassi says. ■

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CME/CE QUESTIONS

1. According to William Schaffner, MD, what range of people used to die of measles in the U.S. in the pre-vaccine era?
 - a. 50-100
 - b. 100-200
 - c. 300-400
 - d. 400-500
2. How long was an unvaccinated child who acquired tetanus hospitalized in a pediatric ICU?
 - a. 27 days
 - b. 33 days
 - c. 47 days
 - d. 55 days
3. According to the CDC, people who inject drugs are 16 times more likely to:
 - a. become addicted.
 - b. develop a serious staph infection.
 - c. divert drugs in healthcare.
 - d. cause violence in the emergency department.
4. A Danish study of 650,000 children showed administration of the measles vaccine caused no increased risk for:
 - a. Asperger's.
 - b. attention deficit disorder.
 - c. anemia.
 - d. autism.

CME/CE OBJECTIVES

Upon completion of this educational activity, participants should be able to:

1. Identify the clinical, legal, or educational issues encountered by infection preventionists and epidemiologists;
2. Describe the effect of infection control and prevention issues on nurses, hospitals, or the healthcare industry in general;
3. Cite solutions to the problems encountered by infection preventionists based on guidelines from the relevant regulatory authorities, and/or independent recommendations from clinicians at individual institutions.